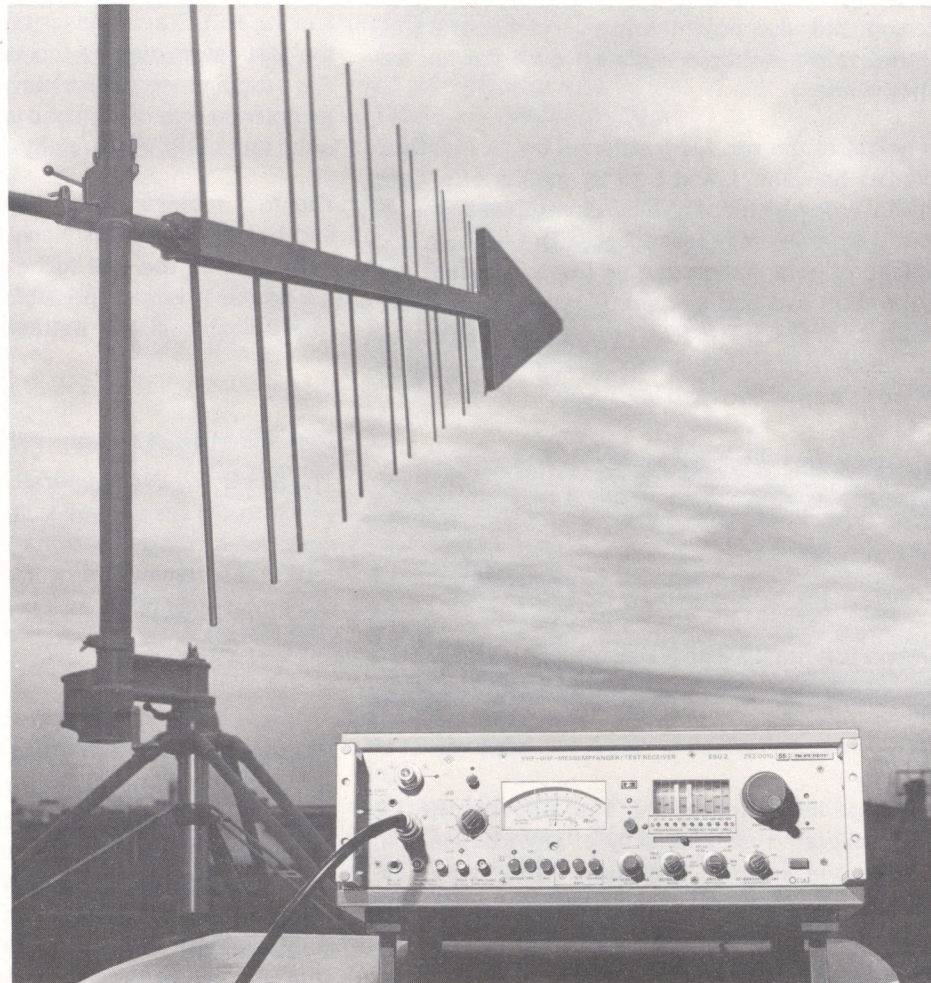


VHF-UHF FIELD-STRENGTH METER

(20) 25 to 1000 MHz



APPLICATIONS

Propagation and coverage measurements
 Determination of antenna patterns
 Interference field-strength measurements to VDE and CISPR recommendations
 Radiosurveillance and monitoring, remote frequency measurement

SPECIAL FEATURES

Full frequency range covered with only two broadband antennas
 Programmable 25–1000-MHz Test Receiver ESU 2 offers:

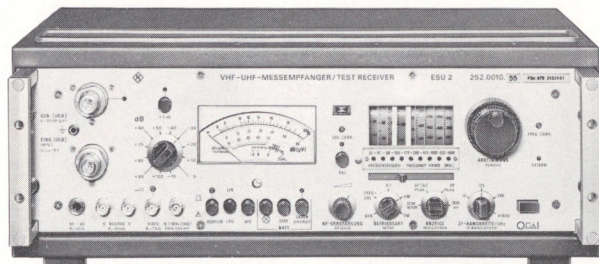
- > wide measurement range
- > rapid automatic level calibration
- > generator output for calibration during field-strength measurements
- > battery or AC operation
- > use with frequency controller and panoramic-display unit
- > extension to partly and fully automatic test assemblies

Characteristics and Uses

The VHF-UHF Field-strength Meter HFU 2 is designed for measurements on useful fields (propagation, coverage, monitoring and surveillance, and antenna patterns) as well as on interfering fields (in accordance with the recommendations of VDE and CISPR). The meter consists of the **programmable VHF-UHF Test Receiver ESU 2**, two **broadband antennas**, a **mast** and various **accessories**.

A fixed-length dipole is used as the test antenna for frequencies between 25 and 80 MHz. Compensation is used to keep the effective antenna impedance constant over the entire frequency range. Above 80 MHz measurements are made with a log-periodic antenna type HL 023 — which not only features good matching, but also provides a gain of about 6.5 dB (referred to an isotropic radiator) over the full frequency range.¹⁾

The height of the receiving antenna on its mast can be varied between 1 and 5 m by means of a hand crank in order to identify field-strength maxima as required by many test procedures. The azimuth and the plane of polarization can be freely adjusted and the elevation can be fixed within an angle of $\pm 30^\circ$ from the horizontal. The field strength in dB(μ V/m) is obtained by adding the antenna factor k (in dB) to the measured voltage read in dB(μ V).



Test Receiver ESU 2 — basis of the Field-strength Meter HFU 2

The voltage indication on the **Test Receiver ESU 2** can be calibrated automatically at any frequency in less than one second. Amplitude- and frequency-modulated signals can be demodulated and measured with the receiver. It can also be used to obtain the sync-peak rms vision-carrier level of negatively modulated TV transmissions and to make measurements on pulse-modulated signals.

Three IF bandwidths — 15 kHz, 120 kHz and 300 kHz — are available for selection at the receiver. Further evaluation of the signal can be carried out at a number of outputs: three at IF (one of which is intended for the Panoramic Adapter EZP), two direct-coupled from AM and FM demodulators, one at AF for use with loudspeaker or headphones, and two providing level- and frequency-proportional signals for recording purposes.

The indicating meter on the ESU 2 has both 20-dB linear and 60-dB logarithmic scales. This latter range is particularly useful when monitoring widely varying

signal levels over long periods in conjunction with a YT recorder.

When the HFU 2 is extended it is also possible to **program** field-strength measurements. The Frequency Controller EZK permits digital frequency setting. Both the ESU 2 and the EZK can be connected to the IEC bus (IEC 625-1) by means of the IEC-bus Adapter ESU 2-Z4 (see data sheet 253301). The Programmable VHF-UHF Test Equipment MSUP combines the units ESU 2, EZK, EZP and ESU 2-Z4 in a single cabinet (data sheet 253351). A fully automatic field-strength test assembly is obtained by adding a computer acting as a bus controller. With the software — including programs for various applications — supplied for the Process Controller PPC and the Tektronix desktop computing system 4051, the factor k of the HFU 2 antennas is taken into account, so that the test result directly represents the field strength. For programmed adjustment of the antenna azimuth, an antenna rotator matched to the IEC bus is available upon request.

The test receiver is equipped for both AC-supply and battery operation. Each full charge of the NiCd cells permits the unit to be used for approximately 3.5 hours. It is also possible to power the receiver from an external 24-V battery.

Determination of antenna patterns

The 86 dB(μ V) EMF generator output of the receiver, which tracks the reception frequency, eliminates the need for a reference signal source and allows pattern measurements to be made by referring only to the meter indication (using either linear or logarithmic scales).

Measurement of interference field strength

The Field-strength Meter HFU 2 can be used to measure sinusoidal or impulsive interference. It complies fully with the Federal German regulations given in VDE 0876 and 0877 and the international recommendations published by CISPR²⁾ for the measurement of radio noise field strength. Field-strength measurements can be carried out in accordance with VDE 0871, 0872, 0875 and 0879.

The above-mentioned calculator control also permits measurements of radio noise field strength to be made **automatically**, the convenience consisting in the automatic recording of the measured values over a wide dynamic range.

¹⁾ Where a smaller antenna is called for, similar performance can be achieved with the log-periodic antenna HL 015 (450 to 2500 MHz) — see Data Sheet N 6-165 (100 109).

²⁾ CISPR Publication 2: "Specification for CISPR radio interference measuring apparatus for the frequency range 25 MHz to 300 MHz"; CISPR Publication 4: "Specification for CISPR radio interference measuring apparatus for the frequency range 300 MHz to 1000 MHz".

When powered from the AC supply, a number of **auxiliary instruments** can be used with the HFU 2 to extend its range of applications:

The **Frequency Controller EZK** (see Data Sheet N 6-258/255 001) permits digital frequency selection or digital display of a manually tuned reception frequency. By engaging the digital frequency control mode (DFC) a set reception frequency can be held with extremely high accuracy to enable, for example, long-term recording of fluctuating or intermittent signals using a YT recorder.

With the **Panoramic Adapter EZZ** (see Data Sheet N 6-257/254 001) a spectral display covering up to ± 1 MHz from the receiver centre frequency (IF analysis) or sweeping a maximum of one receiver sub-range (RF analysis) can be generated. The EZZ also has outputs for connection of the **Radiomonitoring Recorder ZSG 3** which is intended for band-occupancy logging applications.

Field-strength spectra can be plotted using the **XY Recorder ZSK 2**.

Specifications

Frequency range	(20) 25 to 1000 MHz ¹⁾
Measurement range (frequency dependent)	
lower limit	-7.5 to +13 dB(μ V/m)
upper limit	+122.5 to +143 dB(μ V/m)
Measurement error (including antenna)	< 3 dB

Receiver	VHF-UHF Test Receiver ESU 2
Input from antenna	type N female connector ²⁾
Input impedance	50 Ω
Frequency range	25 to 1000 MHz in nine subranges
Measurement range	-10 to +120 dB(μ V)
Measurement error	≤ 1 dB
Weight including batteries	30 kg
For further details see Data Sheet 252 001.	

Antennas

Broadband Dipole HFU 2-Z1	(20) 25 to 80 MHz
Connector	type N female ²⁾
Antenna impedance	50 Ω
VSWR	< 2
Antenna factor k	7.5 to 12 dB (frequency dependent — curve supplied)
Dimensions and weight	3 m long, 0.8 m demounted; 2.5 kg
Log-periodic Broadband Antenna HL 023	80 to 1300 MHz
Connector	type N female ²⁾
Antenna impedance	50 Ω
VSWR	< 2 from 80 to 1000 MHz
Antenna factor k	2.5 to 24 dB between 80 and 1000 MHz (frequency dependent — curve supplied)
Dimensions (approximate)	1.7 m long, 2 m wide; 1.7 x 0.5 m demounted
Weight	6 kg

Antenna Mast

Antenna height on mast	adjustable between 1 and 5 m
Polarization plane	freely adjustable
Azimuth	freely adjustable
Angle of elevation	adjustable within $\pm 30^\circ$ from horizontal
Dimensions and weight	1.65 m long (dismounted); 36 kg
Material	epoxy glass

Tripod

Dimensions and weight	0.9 m long, 0.22 m diameter (collapsed); 9 kg
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¹⁾ An HFU 2 version for 20 to 1000 MHz is available with slightly restricted performance.

Spurious response at 21.4 MHz

Indication on ESU 2 with terminated RF input < 0 dB(μ V), typical

Measurement error in range 20 to 25 MHz (including antenna) < 4 dB, antenna factor k increasing up to 18 dB

²⁾ By using screw-in assemblies the user can easily adapt this connector to many other systems; see Data Sheet 902 100.

VHF-UHF FIELD-STRENGTH METER

Order designation	► VHF-UHF Field-Strength Meter HFU 2
for 25 to 1000 MHz (standard version)	253.0013.55
for 20 to 1000 MHz	253.0713.99

The following equipment is supplied (items may also be ordered separately):

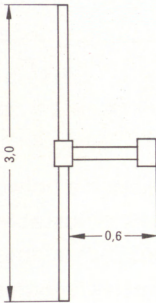
VHF-UHF Test Receiver ESU 2 complete with AC supply cable, battery cable (for external battery) and battery unit without batteries)	
for 25 to 1000 MHz (standard version)	252.0010.55
for 20 to 1000 MHz	252.0010.59
Broadband Dipole HFU 2-Z1 (20 or 25 to 80 MHz) in carrying bag	253.0113.55
Log-periodic Broadband Antenna HL 023 (80 to 1300 MHz) in carrying bag	465.8716.55
Tripod HFU-Z in carrying bag	100.1114.02
Mast HFU-Z with swivel arm and antenna bracket, in carrying case and bag	100.1120.02
RF cable HFU 2-Z5 (7 m long)	252.0055.55
Headphones	110.2959.00
Manual	

Recommended extras

RF cable HFU 2-Z4 (12 m long)	252.0090.55
20 NiCd cells RS 4 (IEC KR 33/61), order no. for one cell	252.6001.00
Panoramic Adapter EZP	254.0017.02
Radiomonitoring Recorder ZSG 3 (for use with EZP)	242.6015.92
Cable EZP — ZSG 3	251.9488.00
Frequency Controller EZK	255.0010.02
IEC-bus Adapter ESU 2-Z4	253.3012.02
Clamp-on RF Current Probe ESU-Z (25 to 300 MHz)	100.1137.02
Cable for connection to ESU 2	204.1090.02
Absorbing Clamp MDS-21 (30 to 1000 MHz)	194.0100.50
BNC-female to N-male adapter (for RF Current Probe and MDS-21)	118.2812.00
XY Recorder ZSK 2	290.2016.04
Log-periodic Broadband Antenna HL 015 (450 to 2500 MHz)	100.1108.50
Dezifix-B to N-female adapter (for connection of Antenna HL 015)	408.4667.00
Accessory units for card-controlled operation in Data Sheet 252010	
Accessory units for operation by desk calculator control in Data Sheet 253351	

Dimensions (in m)

Broadband Dipole 25 to 80 MHz



Log-periodic Broadband Antenna HL 023
80 to 1300 MHz with Mast and Tripod

